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Introduction
The gestational length in horses is extremely variable with reported normal values ranging between 320 and 360 days. Inappropriate timing of an induced parturition can lead to dystocia, premature placental separation, fetal hypoxia, dysmaturity, or stillbirth. Therefore induction of parturition in healthy mares as a routine procedure is not recommended. However, labour has been successfully induced in selected cases of severe maternal illness, and as a routine procedure in clinical research and stud farm management. So is it ever appropriate to induce parturition in the mare?

Data acquisition
PubMed was searched using multiple combinations of the terms ‘induction of parturition’, ‘horse’, and ‘equine pregnancy’. Cross-referencing from studies yielded additional reference.

Criteria for induction of parturition at term
Final fetal maturation only occurs in the last few days prior to parturition, and is crucial for survival and well-being of the newborn foal [1]. The equine fetus does not manifest any physical signs of impending delivery until the onset of second stage labour when it rotates and moves towards the birth canal [2]. It is therefore necessary to determine fetal maturity based on maternal signs alone [3]. These maternal signs include:

- Appropriate gestational length (>320 days)
- Adequate mammary development
- Presence of colostrum with an appropriate calcium level
- Relaxation of cervix and pelvic ligaments.

Milk calcium carbonate rises rapidly just before and around foaling, and relative concentrations of sodium and potassium invert, with potassium becoming greater than sodium. These characteristic changes are a good indicator for fetal readiness for birth [4]. A milk calcium level of >10 mmol/l was suggested as a critical benchmark for fetal readiness for birth. A study by Leadon et al. published poor foal survival if prepartum calcium levels were <3 mmol/l when parturition was induced [5]. A field study measured mammary calcium secretions in 59 healthy mares prior to foaling with a colorimetric test kit for water analysis [6]. The positive predictive value of a positive test was 99.6% indicating that late parturition could be predicted with 99.6% accuracy in the mare.

Inducing agents
A variety of agents and methods have been used to induce parturition in the mare, including administration of glucocorticoids, prostaglandins and oxytocin. Use of corticosteroids alone resulted in serious complications and dystocia in one study [3]. High doses of dexamethasone (100 mg i.m.) given daily to 5 Thoroughbred mares from 315 to 318 days gestation induced precocious fetal maturation and early delivery of healthy foals [9].

Natural prostaglandin PGF2α and synthetic analogues have been used in several studies [3,10], but side effects included premature placental separation, stillbirth, prematurity and foal death following induction. Moreover the interval between administration of prostaglandin and delivery was very variable (1–48 h) [2].

Oxytocin is the drug of choice for induction of parturition. A huge range of doses can be found in the literature. While earlier studies reported use of high doses up to 100 iu, McPherson et al. evaluated 3 treatment protocols (75 iu i.m., 15 iu i.m. every 15 min, and CRI of 1 iu per min), and did not see any difference in foal viability or time from administration until delivery [11]. Pashen successfully used 2.5–10 iu diluted in 200 ml of saline over 15 min [12], and Camillo et al. were able to consistently induce parturition within 120 min with 2.5 iu i.v. daily in Haflinger mares [13]. A recent field study administered 3.5 iu i.v. once daily in 174 Standardbred mares when mammary calcium concentration indicated fetal readiness for birth [14]. 69% of mares foaled within 120 min of administration (51.3% after first injection, 14.2% after second injection, and 3.4% after the third injection), the remaining mares foaled outside the 120 min time window. The procedure was considered safe and there was no significant difference between treated mares and 176 untreated controls in gestational length, duration of foaling, incidence of dystocia, failure of rupture of the allantochorion and retention of fetal membranes.

Although mares can be successfully induced with a closed cervix [3], Rigby et al. showed a positive effect on neonatal adaptability, when the mare’s cervix was treated with prostaglandin E 6 h prior to induction of parturition to help cervical dilation and ripening [15].

Summary
In selected cases of maternal or fetal illness it can be appropriate to induce parturition when the benefits of induction outweigh the risks associated with it. Labour can be induced safely with oxytocin if the criteria for fetal and maternal readiness for birth are met. More physiological low doses of oxytocin (2.5–10 iu) as a single intravenous bolus is preferred.

References


